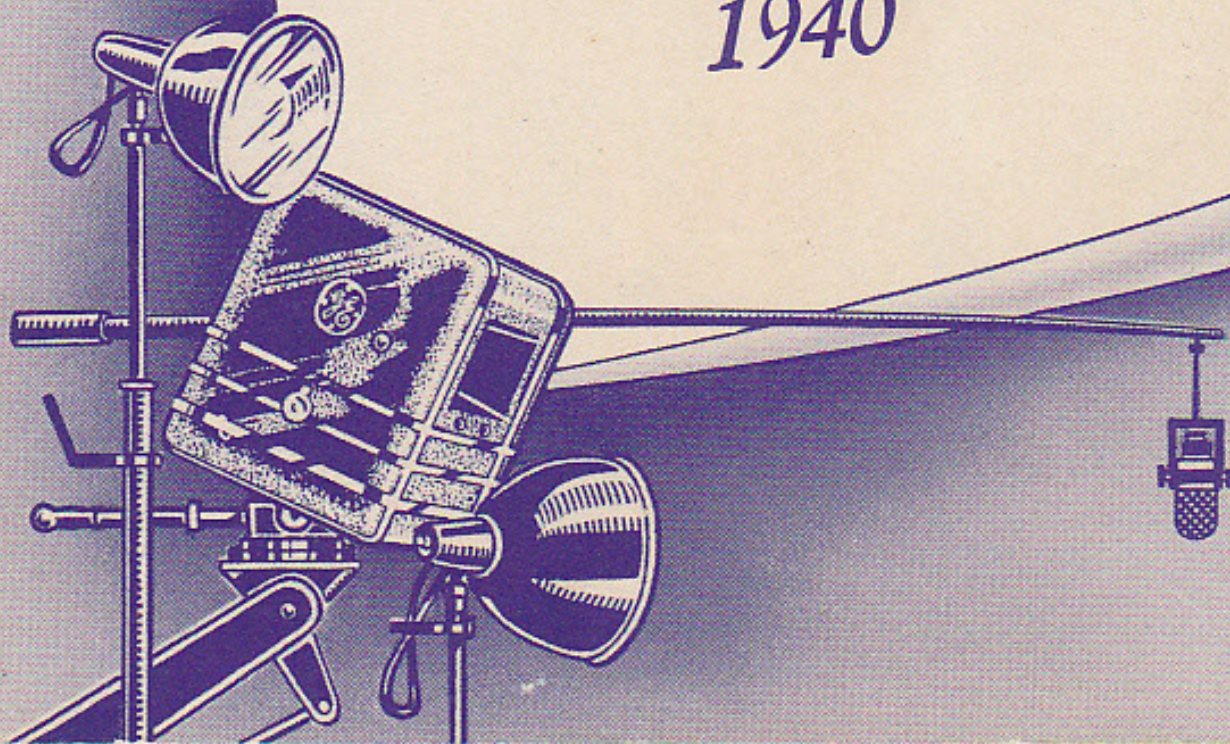


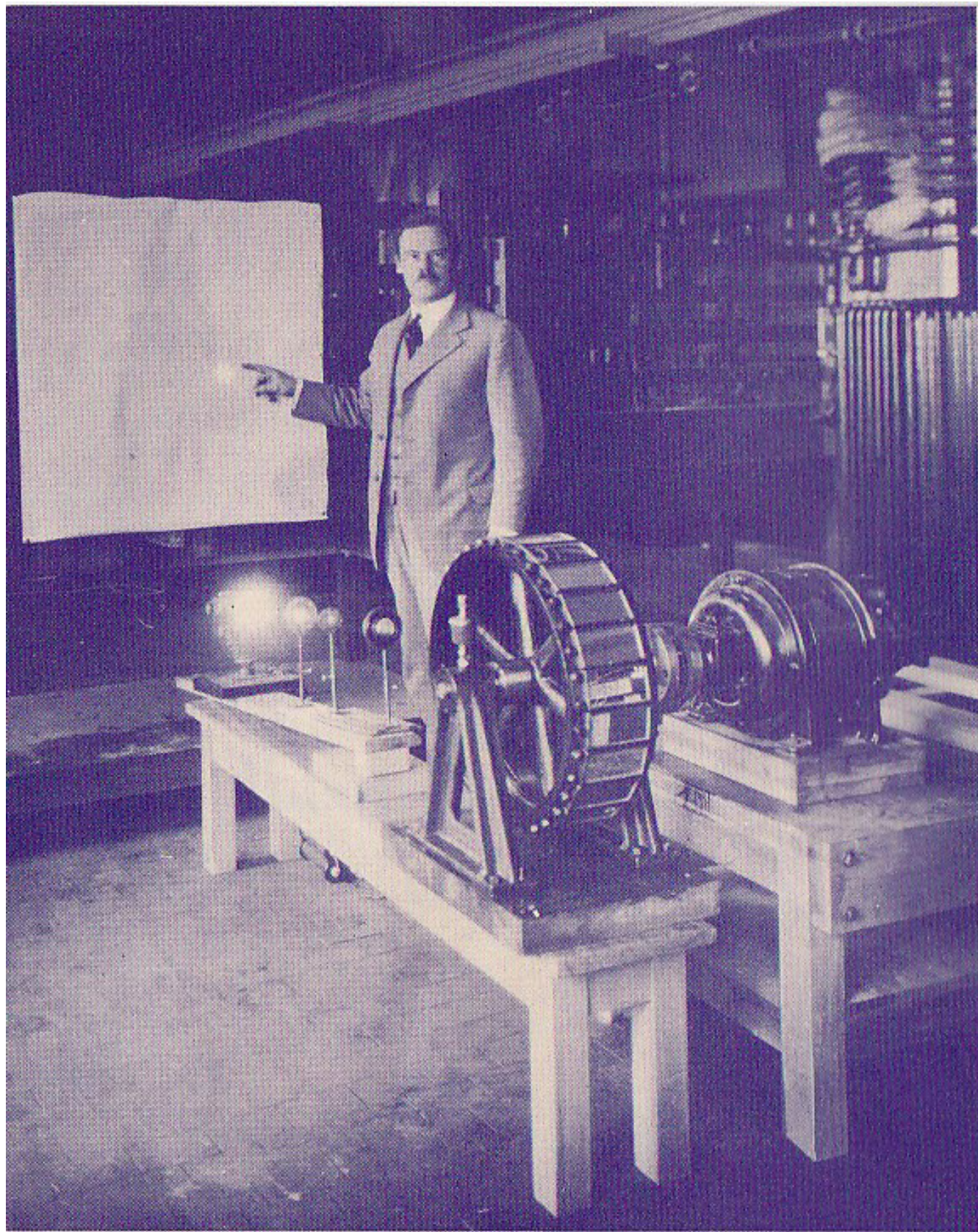
Be It Known That  
On *Oct 14* 1940

*Mr. Brockhoff*

was televised at the  
General Electric Exhibit  
NEW YORK WORLD'S FAIR  
1940







*General Electric's famous radio and television engineer, Dr. E. F. W. Alexanderson, demonstrating his mechanical television projector in 1926.*



# General Electric's "Famous Firsts" in Television History

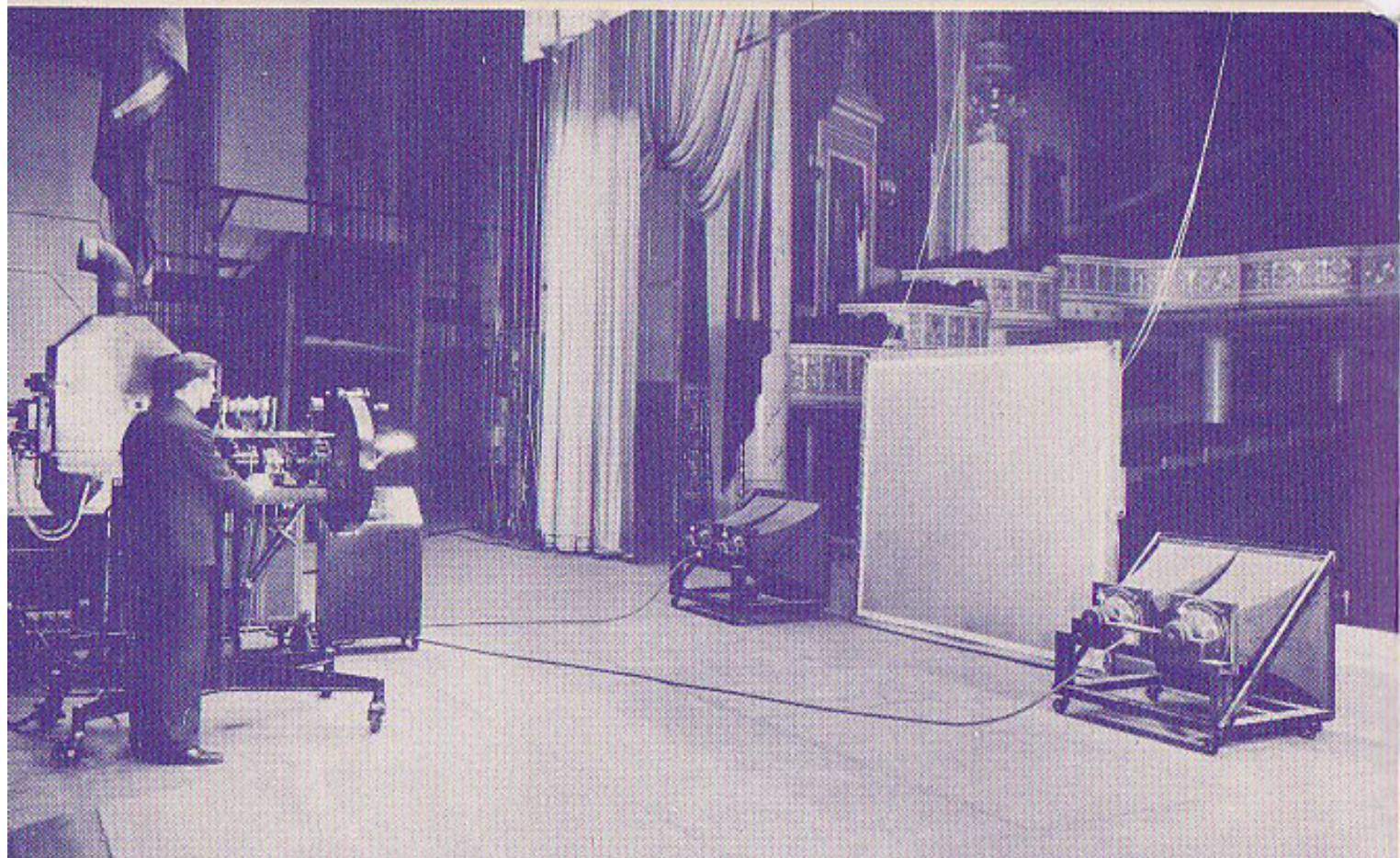
Modern high-definition television, the result of many years of research, was introduced to the public at the opening of the 1939 New York World's Fair. So popular was its acceptance that it is being featured again in 1940. Some of General Electric's contributions to this new method of communication are listed here:

- 1926—Dr. E. F. W. Alexanderson, G-E engineer, developed a mechanical method of television, using mirrors mounted on a wheel.
- 1927—Experiments using a rotating perforated disk to scan the image proved successful in the General Electric laboratory.
- 1928—January—first public demonstration of television was made in the home of Dr. Alexanderson.

*On January 11, 1928, Dr. Alexanderson held the first public demonstration of television in his home.*







*How projection television was shown to a theater audience for the first time at Proctor's Theater, Schenectady, N. Y., on May 22, 1930.*

- 1928—May—WGY, G-E radio station at Schenectady, became the pioneer television station broadcasting on a regular schedule of three afternoons a week. August—first broadcast from outdoors was of Governor Alfred E. Smith as he made his acceptance speech at Albany, N. Y. September—first play presented on television—"The Queen's Messenger" from radio station WGY.
- 1929—General Electric engineers produced television images by means of a cathode-ray tube. This was the forerunner of modern picture tubes.
- 1930—General Electric engineers projected television upon a large screen before a theater audience, for the first time, at Proctor's Theater, Schenectady, May 22.
- 1931—Using a 30-line, 15-picture-per-second television system, G-E engineers sent geometric patterns to Berlin, Germany, with a fair degree of success.



1939—The first long-distance reception of modern high definition television took place in the Helderberg Hills near Schenectady. There, 129 miles from New York City, G-E engineers received pictures of King George and Queen Elizabeth of England touring the New York World's Fair on June 10.

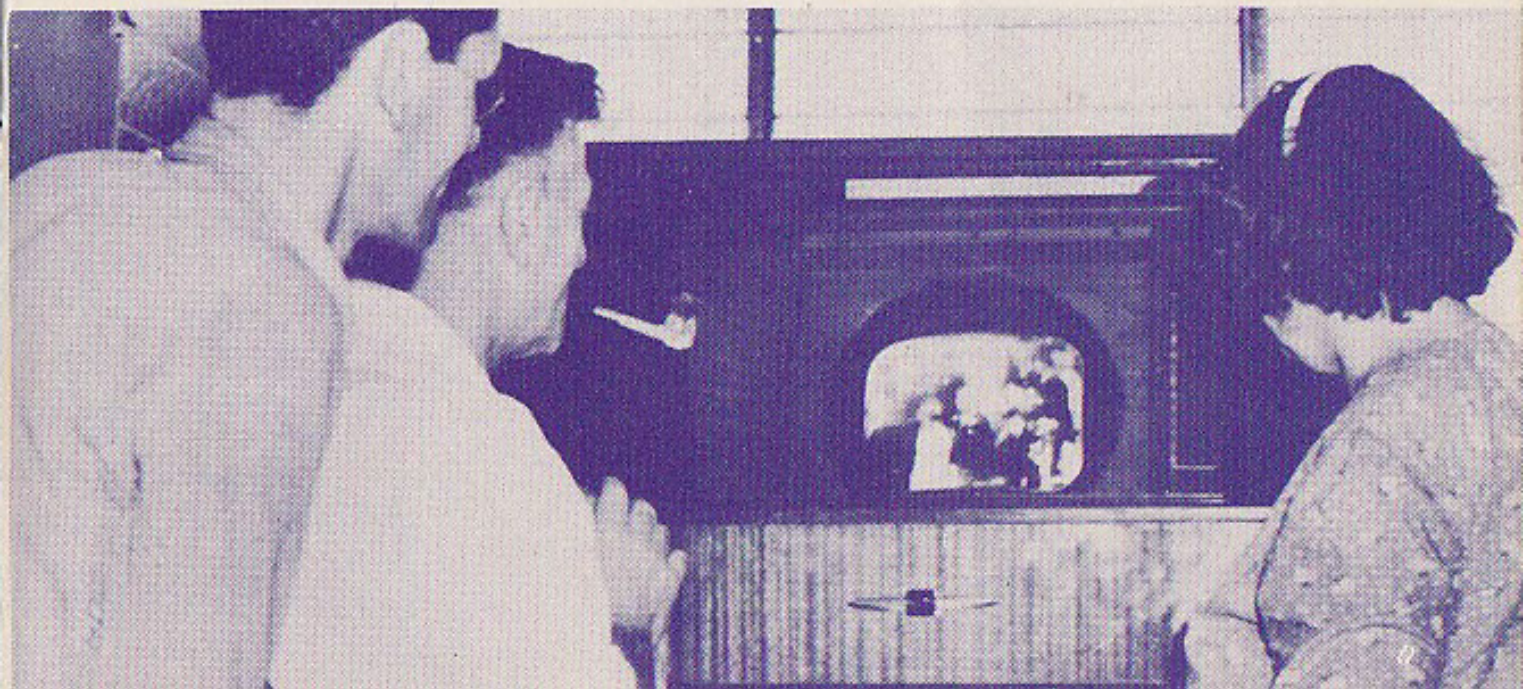
1940—The first television network was put into service on January 12, when the General Electric relay station and television transmitter W2XB began rebroadcasting New York City television programs to the Albany-Schenectady-Troy area.

On Easter Sunday G-E engineers established a new record in long-distance reception of a regular television network program. Atop Whiteface Mountain in upper New York State a program was received from New York City, 250 miles away, through the General Electric relay station W2XB.

\* \* \* \* \*

Today General Electric continues its television developments in order to bring the wonders of television to people all over America.

*One hundred twenty-nine miles away they toured the Fair with the Royal Party.*





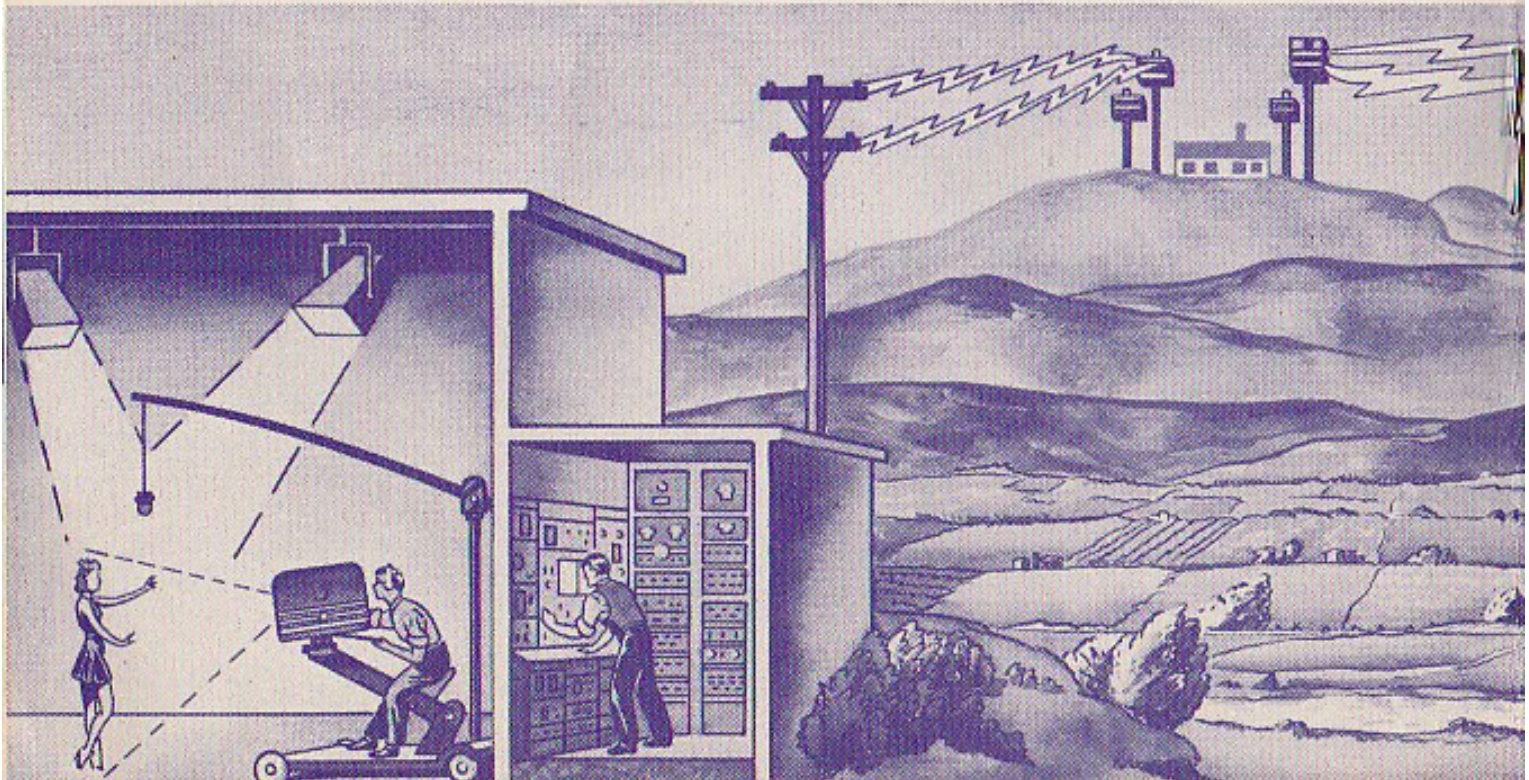
## HOW TELEVISION WORKS

An elementary idea of how television works may be obtained from the diagram below. At the extreme left is the television studio where the camera "sees" the televised scene. Inside the camera is a special vacuum tube which changes the image from light into electricity. The picture, now a series of electrical impulses, is sent over a cable to the control panel, where an engineer watches to make sure that the equipment is functioning properly to produce a satisfactory picture. The picture is then transmitted by radio waves to the television broadcast station, which in this case is situated a few miles away on the top of a hill.

The sound, which accompanies the television picture, is picked up by a microphone in the studio and carried by wire to the control room. It too is sent by radio waves to the transmitter. Both the sight and sound are then broadcast together to the television receivers throughout the area covered.

The two radio signals which carry the picture and sound

*The television program originating in the studio is sent to the transmitter.*





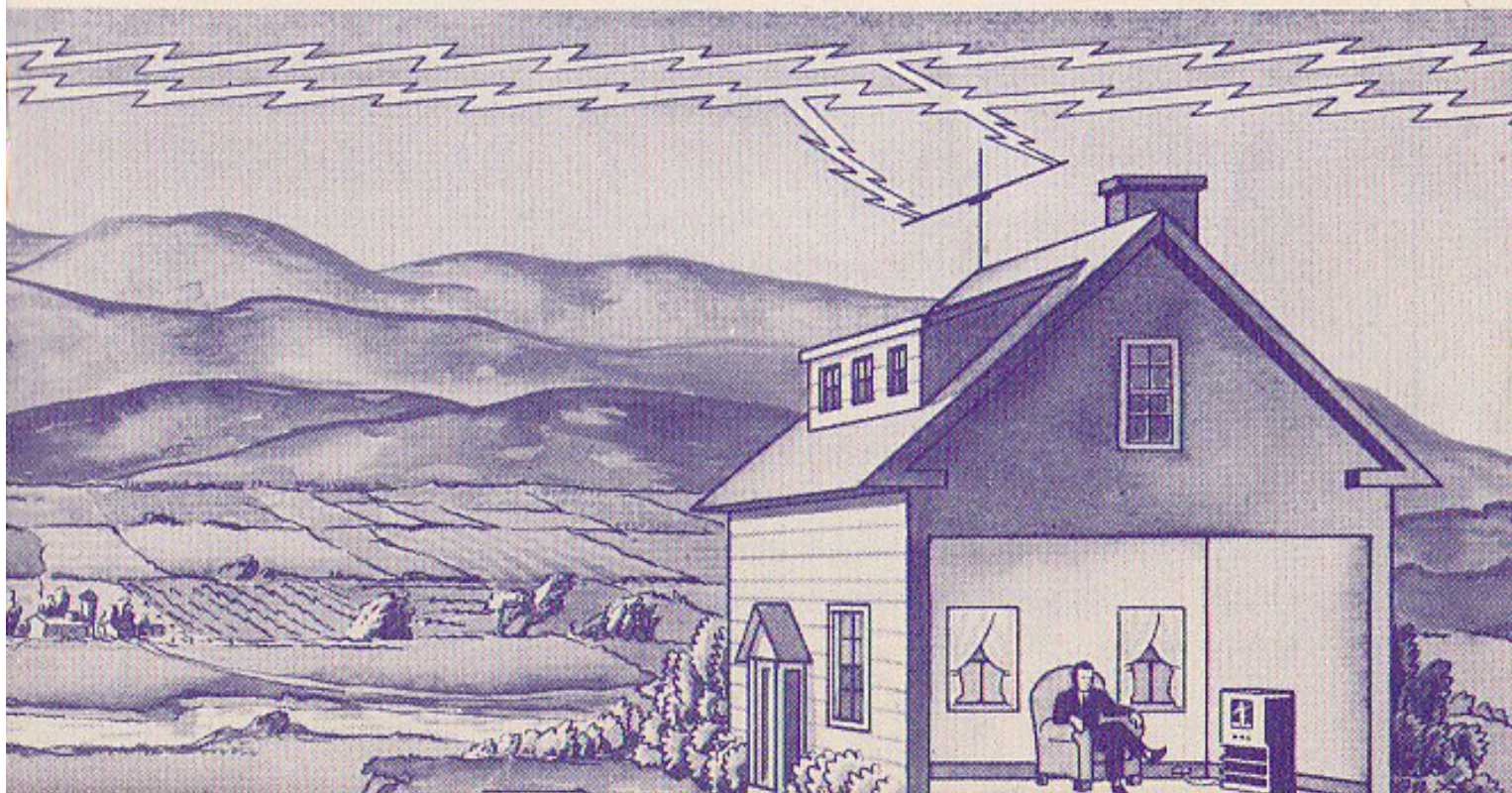
are received on the same antenna and are separated inside the receiving set. The one signal actuates the picture tube to reproduce the scene being televised; the other signal operates the loud-speaker to reproduce the sound picked up in the studio. Thus we are able to see and hear events taking place miles away.

Television is broadcast on very short radio waves, which can be received only a relatively short distance from the transmitter—usually less than one hundred miles. However, it is possible to pass the signals along from station to station, so that much greater distances can be covered.

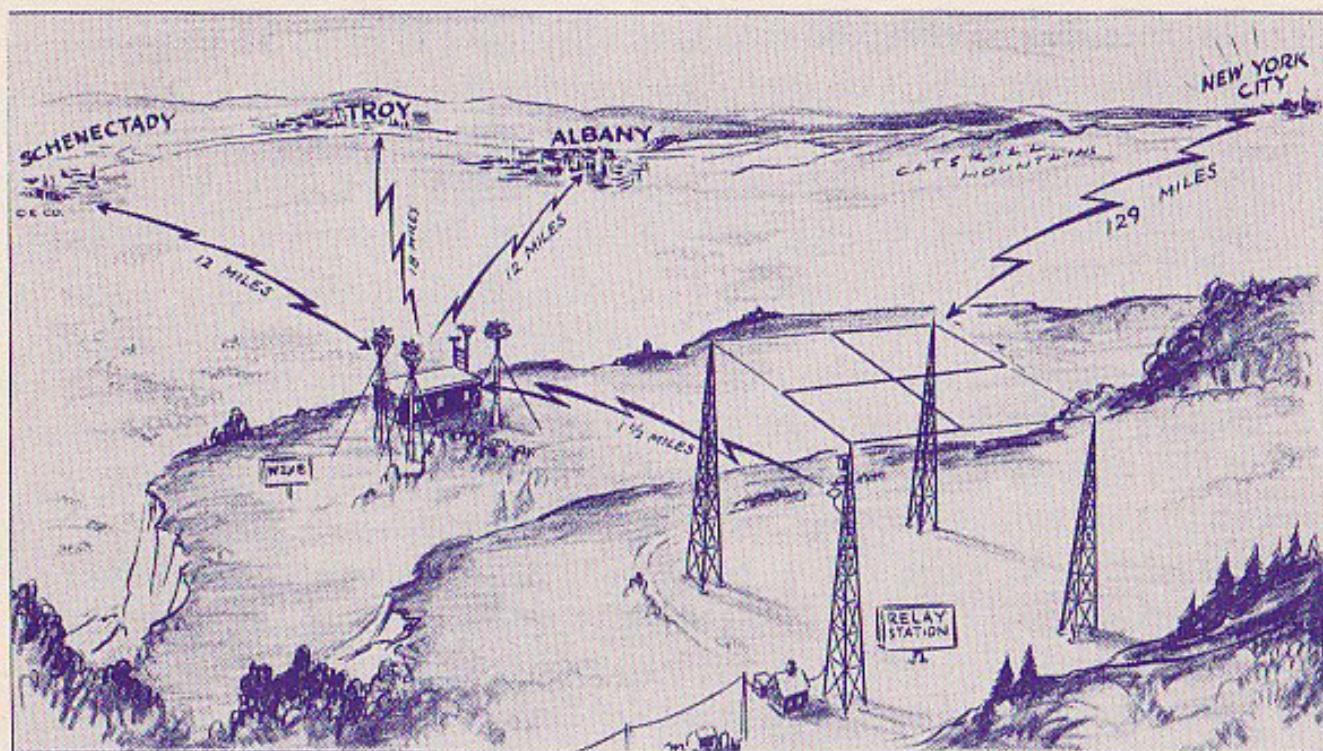
General Electric has a relay station in regular operation at Schenectady, N. Y. This relay station picks up the programs from New York City, 129 miles away, and then re-broadcasts them to the Albany-Schenectady-Troy area.

There is another method of transmitting television programs for great distances—by means of a coaxial cable laid between two television stations. However, the high cost of using coaxial cable limits its use at present.

*From the transmitter it is broadcast, to be picked up by television receivers.*







*America's first television relay, operating through General Electric's station W2XB on a regular schedule, was inaugurated on January 12, 1940.*

## How Scanning Is Accomplished

Those who are technically minded will be interested in the process of converting light into electricity and back again—a process known as “scanning.” The picture is changed into an electrical form in the camera by the camera tube. At the receiving end it is changed back into a picture in the picture tube.

Inside the camera tube is a plate which, because it is covered with myriads of tiny photoelectric cells, is sensitive to light. As each cell receives light from the viewed object, it sets up an electric charge in proportion to the amount of light falling upon it.



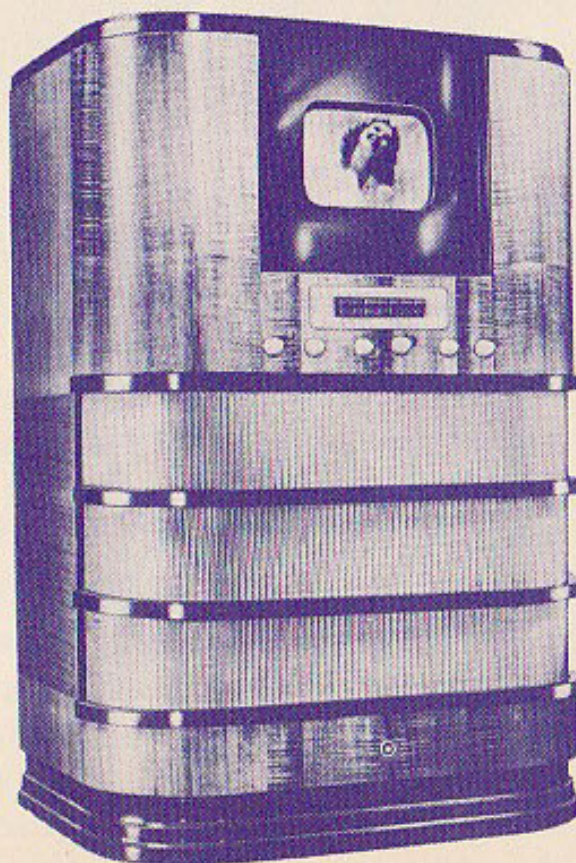
The scanning process removes the charges from the tiny cells on the surface of the plate or "mosaic" by means of a very thin beam of electrons shot out from an "electron gun" in the neck of the camera tube. The electron beam is caused to scan the mosaic by means of apparatus external to the camera tube. Ordinarily, the scanning would be in successive horizontal lines beginning at the upper left edge of the mosaic and continuing downward ending at the lower right edge of the mosaic. However, since the lens system of the camera reverses the image on the mosaic, the actual scanning is from the lower right edge to the upper left edge. This scanning process is repeated 30 times per second; that is, each element of the picture is scanned by the electron beam 30 times per second. This high rate of picture repetition is necessary in order that flickering of the picture will not be noticeable and in order to avoid the effect of jerkiness when rapidly moving objects are televised.

The picture comprises 441 horizontal scanning lines, and, since each whole picture is scanned 30 times per second, it can be computed that the scanning spot moves approximately  $2\frac{1}{2}$  miles per second. As each tiny element of the mosaic is struck by the electron scanning beam, it gives up its charge, which is proportional to the intensity of the light at that particular spot on the mosaic. The charge is then transmitted over a cable to the amplifiers and the radio transmitter.

Upon reaching the television receiver, these electrical impulses are amplified and fed into the picture tube, where a beam of electrons scans the viewing end of the tube in exact synchronism with the electron beam in the camera. The viewing end of the picture tube is coated with fluorescent material, which glows when struck with the beam of electrons. The glow varies in proportion to the strength of the electron beam, which is constantly varying as the incoming signal varies. Thus, each individual point on the end of the picture



tube glows with a different intensity, depending on the strength of the electron beam at the instant that particular point was struck. Because of this, the picture is made up of points of light and shadow—like the original scene. Synchronization of the electron beams in the camera and picture tubes is achieved by a separate electric impulse, which periodically co-ordinates the electron beam in the camera tube and the electron beam in the picture tube, bringing them back to the starting point together at the end of each line and at the end of each picture.



*A medium-priced General Electric television receiver.*



# GENERAL ELECTRIC

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